

Healing the People, Healing the Land: Weaving Ethnoecology Curricula into Environmental Studies Programs

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INTRODUCTION

In 2011, I developed an Ethnoecology class at California State University Sacramento, the first time it had been taught in the 40 years of the Environmental Studies Program. Ethnoecology provides a living cultural perspective, weaving together an understanding of the reciprocal relationship between human cultures and contemporary land management. **Ethnoecology** is defined as the study of how unique groups of people living in different locations understand and interact with the surrounding environment. The field of study combines “ecology”, the study of interactions between living organisms and their environment, and “ethno” or a localized study of people. The development of the field lies in applying and understanding indigenous knowledge systems of land management, placing it in both a global and site specific context. The field of ethnoecology seeks valid, reliable understanding of how we as humans have interacted with the environment and how these intricate relationships have been sustained over time.

The ethnoecology course is designed to differentiate and give specific examples of Scientific Ecological Knowledge, Traditional Ecological Knowledge and Traditional Resource Management knowledge systems and utilize critical thinking skills to evaluate their significance to contemporary land management practices. A western scientific world view is standard for environmental science and policy coursework; students are often uncomfortable with illustrations of traditional knowledge that includes cultural and spiritual beliefs. Unlike courses offered within Indigenous communities and colleges, most students in my courses are unaware of Indigenous knowledge systems or beliefs. For the most part, students have never heard of Traditional Ecological Knowledge (TEK) or Traditional Resource Management (TRM). A working definition of TEK developed by Berkes et al. (2000) is, “a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmissions, about the relationship of living beings (including humans) with one another and with their environment”. Interest in Traditional Ecological Knowledge (TEK) has been growing in the ecological field in recent years, partly due to the recognition that such knowledge can contribute to the conservation of biodiversity (Gadgil et al. 1993); rare species (Colding 1998); protected areas (Johannes 1998), ecological processes (Alcorn 1989), and to sustainable resource use in general” (Berkes et al. 2000).

This chapter is organized by first looking at the lack of historic ecology and ethnoecology in evaluation of modern socioeconomic and environmental problem-solving and land management. The chapter reserves learning objectives and outcomes for the ethnoecology class within the context of an environmental studies program. We then discuss specific class projects to achieve these learning objectives including experiential learning and field trips, a personal guided journal, an ethnobotany group project, a capstone ethnoecology research paper. Student comments on the value of the ethnoecology course are included, as well as a normative assessment of how well students achieved the learning objectives.

Introduction – My Story, Why I think Ethnoecology is Important to Environmental Studies

By writing in the first person narrative, I tie together my life experiences as a wetlands and restoration ecologist and person of Native descent (Nez Perce or *Nimi'ipuu*); it is very important to me to advocate for inclusion of cultural knowledge and traditional management in environmental studies classes. Also, the context of my professional and research experiences convinced me of the need to develop an Ethnoecology course curriculum based on the cultural, scientific and personal importance of Indigenous knowledge to contemporary land management challenges. As a senior wetlands ecologist in the State of Washington in the late-1980's, it was very disappointing to have chapters on the contribution of traditional resource management eliminated from two books on restoration (Stevens and Vanbianchi 1993; Vanbianchi et al. 1994). My doctoral research enabled me to study the ethnoecology and restoration ecology of white root (*Carex barbarae*), a plant used by California Indian basketweavers to create beautiful baskets iconic to Native culture in Northern California (Stevens 1999). The ethnographic components of my dissertation allowed me to build relationships and friendships with the local Miwok community. These relationships resulted in one of the most rewarding experiences of my life. Teaching ethnoecology and writing about the Indigenous pedagogy is an opportunity to give back to the community I love and respect, and help carry on the tradition.

My research illustrates the iconic and artistic richness of basketry traditions to Native Californians, as well as documenting the ecological significance of TEK and TRM on wetlands ecology (Stevens and Zelazo 2015, Stevens 2003, Stevens 1999). Data from multiple sources suggests that TRM increased the productivity of the floodplain rearing habitat, increasing fish growth and reducing fish mortality (*Ibid*). Annual burning stimulated the production of plants used for fishing and basketry technology (Anderson 2005; Bibby 1996; Merrill 1923; Yamane and Aguilar 1997). Thousands of stalks of basketry and fiber materials were required to support the material culture. These species are relatively uncommon today and not in the abundance necessary to support this level of technology (Stevens 1999). Traditional burning and tending practices helped to produce and sustain the plants needed for the material culture. Removing senescent vegetation through burning and tending also maintained a more open and parklike physiognomy in the riparian corridor within the study area (Stevens 1999). Loss of traditional tending practices compounded by widespread degradation of habitat, alteration of flows, and introduction of exotic species has resulted in the catastrophic decline of most California native fish species (Sommer et al. 2001a; Sommer et al. 2001b; Jeffers et al. 2008; Stevens and Zaloza 2015; Yoshiyama et al. 2001). Based on this synthesis of multiple sources of information, it is likely that traditional tending practices optimized habitat productivity and fecundity for California native species, contributing to their resiliency to fluctuating environmental conditions. This data suggests that historic ecology and ethnoecology provides a template for cultural and ecological restoration and conservation of wetland and riparian habitat in California. In my professional work as a restoration ecologist in California, the contribution of historic ecology and ethnoecology to restoration planning and ecosystem management were mostly ignored and often considered irrelevant. It is often difficult to obtain access for local Native Californians to gather culturally significant plant materials on restoration sites. **There is a general lack of inclusion of TRM in the restoration, management or conservation of California's wetland and riparian ecosystems.** The importance of historic ecology in California has been demonstrated by the San Francisco Estuary Institute (Grossinger 2005; Grossinger et al. 2006 **ADD STriplen**) and extensive research by M. Kat Anderson (2005). Indigenous burning, commonly utilized in the pre-European settlement landscape, is rarely incorporated into

environmental documentation, descriptions of reference conditions for restoration ecology, or site management (Hankins 2005; Lewis 1973; Martinez 2002; Stewart 2002).

I began working with eco-cultural restoration of the Mesopotamian Marshes in southern Iraq in 2003 (Eden Again 2003). The Mesopotamian Marshes, or *al Ahwar* in Arabic, provide a prototype or icon of a culturalized landscape, consisting of a reciprocal relationship formed over thousands of years between Marsh Arab cultures and the marshes through Traditional Resource Management (Stevens with Hamid 2011). In order to support a sustainable harvest of their resources, the Marsh Arabs actively managed the reeds (*Phragmites australis*), fish, water buffalo and wildlife in the Mesopotamian Marshes (Stevens 2007). The Iraqi's whom I interviewed provided detailed TEK of culturally significant resources, providing valuable information for emerging models of restoration and ecosystem management for the marshes (Stevens and Hamid 2011). TRM in the marshes consists of selective harvesting and burning of reeds on a seasonal and phenological basis; multiple species management (reeds, fish, waterfowl, bird eggs, rice); burning senescent vegetation to stimulate new growth; spatial and temporal restriction of fish harvest during spawning; and landscape patchiness management. Sadly, political upheaval and upstream water diversions in the Tigris and Euphrates watersheds has resulted in a majority of the wetlands being drained, creating salt-encrusted deserts where marshes once flourished. Because the marsh ecosystem is adapted to human management, maintaining the integrity, and culture of the Marsh Arab society must be prominent in restoration and equitable water management. "The future of the 5000-year-old Marsh Arab culture and the economic stability of a large portion of southern Iraq are dependent on the success of this restoration effort," write Richardson et al. (2005).

My perspective on the practicality of incorporation of weaving TEK and SEK into land management and conservation practices was fundamentally changed as a result of these international experiences (Stevens and Hamid 2-11). I was impressed that linkages between TEK and SEK were appreciated by the Iraqi's, and this knowledge system synthesis could be the "norm" for land restoration and management. It is my intention to bring this knowledge into the classroom, providing students a gestalt of cultural health, sustainable development, and revitalized landscape functions and services.

As I began working internationally, I found the rights of indigenous people and the practice of eco-cultural restoration practices was far more common than in the United States. The rights of indigenous and local people are embedded in international law and treaties such as Article 8j *Traditional Knowledge, Innovations and Practices* of the Convention on Biological Diversity (<http://www.cbd.int/traditional/>); Article VII.8 *Involving Local and Indigenous People in the Management of Wetlands* of the Ramsar Convention of Wetlands (http://www.ramsar.org/sites/default/files/documents/library/key_res_vii.08e.pdf); and the UN *Declaration on the Rights of Indigenous Peoples* (http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf).

ETHNOECOLOGY COURSE BACKGROUND – TRADITIONAL ECOLOGICAL KNOWLEDGE, WESTERN SCIENTIFIC ECOLOGICAL KNOWLEDGE, AND TRADITIONAL RESOURCE MANAGEMENT

This interdisciplinary ethnoecology course contextualizes the vital role of culture in the management and sustainability of local ecosystems. My experiences with Indigenous cultures in different geographies have provided me with insights into the cultural and ecological significance of TEK and TRM. Even more important, I am aware of the ethical importance of maintaining the cultural values of human health, earning a livelihood and well-being. One course objective is to generally explore ways that both Indigenous and Local cultures relate to the landscape, and to evaluate the ecological significance and wisdom of these cultural practices. One way of assessing ecological wisdom is through the litmus test of sustainability: do the current practices maintain human health, ecosystem persistence and economic viability for generations into the future? Human populations have sustainably harvested and managed culturally significant resources for thousands of years, despite high human population densities and fluctuating environmental conditions. Understanding long term cultural and ecological resiliency and management systems has relevance to modern land use policies, and informs development of an Indigenous land management model that promotes both cultural and ecosystem resiliency in ecological restoration. The opposite is also true: without the ecosystem services remaining viable, cultural knowledge can be impaired, forgotten or lost.

Traditional Ecological Knowledge (TEK) is the cultural knowledge system that informs the stewardship and tending of culturally significant resources and ecosystems. TEK informs complex resource management strategies and traditional management practices, including adaptive management as conditions change. Nolan and Turner (2011) point out that *the intrinsic value of diverse ways of knowing, and perpetuating local knowledge, are foci of ethnoecology*. Ethnoecology includes an understanding how and why human attitudes, spiritual beliefs, attitudes, values, memories and emotions are culturally and socially important. TEK incorporates cultural and familial identity, a kin-centric stewardship world view, and a sense of individual responsibility for world balance and renewal through ceremony and prayer. Ethnoecology student responses discussing the importance of cultural and familial identity, and the pride it gives them to learn about their own cultures from the inter-generational transmission of their elders, are provided later in this document.

This Ethnoecology course will evaluate sustainable management of ecosystems by local and indigenous people. Students will become acquainted with the approaches, methods and analyses used by ethnoecologists and ethnobiologists who are research contemporary issues in biocultural diversity and sustainable resource management. The goal of this course is to familiarize students with the fields of ethnobiology, ethnoecology, Traditional Ecological Knowledge (TEK) and Traditional Resource Management (TRM). I begin the course with a study of ethnobiology, defined as the study of the biological knowledge of particular ethnic groups – cultural knowledge about plants and animals (Anderson 2011). I differentiate between ethnobiology (*how humans*

use plants and animals), and ethnoecology (*the study of the interactions or dialectic relationships between human societies and their environment*). I use Berkes (1999) definition of TEK as *an integral body of practical and spiritual knowledge that has evolved through the successful adaptation of an intelligent people to their particular ecosystem*. Indigenous and rural societies of the world place great value on this knowledge; it often defines their collective identity, even when their culture migrates into modern cities and alternative economic and physical landscapes. For example, ex-patriot Iraqi's in San Diego, California, transported the cultural icon of the *mudhif* (traditional guest house built of reeds) from the Mesopotamian Marshes into their living rooms in contemporary suburban housing. Generous Arabic hospitality remains, although the environments are radically different. Pizza example???

Traditional Resource Management of wetland areas **in California and Iraq** includes burning of senescent vegetation to stimulate new growth and create micro-habitats; multiple species management of plant and animal resources; resource rotation; selective harvesting of on a seasonal and phenological basis; spatial and temporal restrictions of fish harvest during spawning; and landscape patchiness management (Stevens 2015; Stevens 1999). Berkes et al (2000) *compares traditional management systems to adaptive management with its emphasis on feedback learning as a response to "uncertainty and unpredictability intrinsic to all ecosystems*. This concept of adaptive management provides a practical application for contemporary natural resource conservation, restoration and management practices. Adaptive management of restoration projects often includes vegetation monitoring to ensure plant survival, clear defined project goals and objectives, and/ or mitigation criteria. TRM by Indigenous people involves monitoring of culturally significant resources; however, the price of failure to maintain resources is starvation, migration or death.

Teaching Approaches to Ethnoecology

An important ethnoecology course objective is to distinguish between Scientific Ecological Knowledge (SEK) and TEK. TEK encompasses intergenerational transmission of knowledge, spiritual world renewal ceremonies, ecological knowledge about adaptive management of cultural resources, and the reciprocal relationships of humans with the land. *TEK observations tend to be qualitative and create a diachronic database, providing a record over long periods of time* (Kimmerer 2011). Participatory research with cultural knowledge keepers such as curanderos, healers, elders and shamans is used to codify the oral tradition. In TEK, research tends to be more participatory, where the local community is involved and consulted in both content and use of research. In contrast, scientific observations tend to be quantitative; surveys or interviews of individuals are objective and "value neutral" with large, randomized and representative samples for statistical analysis and evaluation. SEK frequently lacks the long-term perspective of TEK. TEK often lacks the quantitative and statistical power of SEK, and thus may be dismissed as "anecdotal" information by scientific and regulatory stakeholders.

The word culture was used in two ways within the context of the class. Culture was identified as the place-based relationship of Indigenous people with the local landscape. The term culture was also used to refer to each student's individual exploration of his or her own individual and familial relationships, and how they personally define them. Students are encouraged to develop an experiential and situational knowledge of their personal relationship to culture and nature. Expressions of student inner growth is nurtured by weekly student journal entries; opportunities to create an art project from fiber, soapstone or pine nut beads during the field trip; and a final "Culture, Spirit and Tradition" class project where each student shares music, art, poetry, or writing with the class.

Ethnoecology course content also includes a critical evaluation of whether traditional knowledge is ecologically wise. Students explore a diversity of ways in which people tend, steward, harvest, or otherwise manage their environments and resources. Ecological wisdom and sustainability are synonymous. Students evaluate ecological sustainability and use critical thinking skills through a class debate on the pros and cons of co-management of parks. The class debates contemporary co-management examples such as contemporary Australian Aboriginal fire stick hunting practices; co-management in Death Valley National Park in the Mojave Desert, California, with the Timbisha Shoshone; traditional whaling practices of the Makah Nation in north-west Washington; and local conflicts over casino development. Class debates engender a lively and heated discussion, and fully engage students in evaluating the "ecological wisdom" of Indigenous co-management. This assignment provides a good opportunity to include ethical considerations of environmental justice and intellectual property rights of Indigenous cultures. It is important to note that sovereignty is a key consideration to most place based cultures.

Prayer, thanksgiving, and asking permission to harvest are intrinsic components of both TEK and TRM, although the specifics vary among individuals and local traditions. Based on my experiences of gathering plant materials with local Miwok people, prayer and asking permission always occurred before gathering or hunting, and thanks were always offered after gathering. An optional activity during class field trips is to have the invited tribal elders demonstrate how to pray with tobacco or sage and ask permission when harvesting plant materials. This practice creates a kinship relationship with our non-human relations we share the planet with.

Traditional Ecological Knowledge implies a reciprocal or kincentric relationship with the ecosystem. Enrique Salmón (2000) describes kincentric ecology as *the manner in which Indigenous people view themselves as part of an extended ecological family that shares ancestry...In terms of Indigenous land management techniques, interactions resulting from kincentric ecology enhance and preserve the ecosystems with which Indigenous people have lived for centuries*. Elders in Indigenous communities teach by example, and by the student's willingness to pay attention. Stories in the oral tradition often demonstrate morals, such as showing respect for elders and having good manners. I follow this teaching tradition by asking thought provoking questions, and having the students do the same in self-reflective journal to lead them to a deeper exploration of their own spiritual beliefs and relationships with nature.

Elders that have had previous interactions with my class have complemented students on their good manners, and I believe this experiential education is the most important thing I can provide for the students. .

Class exploration of topics such as a kin-centric world view, ceremony, and world renewal has been uncomfortable for environmental studies students at times. Students in upper division environmental studies courses are familiar and comfortable with western scientific knowledge, the scientific method, and ecological sampling methodologies. TEK systems which incorporate Indigenous perspectives, ceremonies, stories and rituals are unfamiliar to many students. Movies and guest speakers often help illustrate these topics to students in an experiential and non-threatening way. The movie “River of Renewal”, written and directed by Stephen Most, discusses water and fisheries resource conflicts on the Klamath River between Oregon and Washington (Most 2006). Conflicts between stakeholder groups and limited resources illustrate the Karuk, Yurok and Hoopa perspectives on their fish relatives. The film exposes the students to ceremonies of world renewal and first salmon ceremonies, illustrating the concept of *pikiawish* or bringing the world back into balance. This movie also illustrates the value of mediation in building community between Indigenous and other stakeholder groups to resolve allocation of scarce resources and environmental challenges. Students reflected in their journal entries that films and field trips provided experiential access to emotional, spiritual and cultural traditional knowledge in a manner which is often inaccessible to them from lectures or reading material.

ETHNOECOLOGY COURSE DESIRED LEARNING OUTCOMES

The Ethnoecology course begins with providing students a basic understanding of botany and ethnobotany (human uses of plants for medicine, food, fiber, basketry, etc.). Students learn floral morphology, botanic classification systems, ethnobotany and cultural anthropology sampling methods such as conducting surveys, interviews, and participant observations; collecting and mounting voucher plant specimens on herbarium sheets; accessing ethnographic and historic records; and the ethics of developing reciprocal relationships with Indigenous or Local collaborators. Students are also expected to review and comprehend comparative ecological field and research methodologies. Contextualizing SEK and TEK within the framework of contemporary land management practices is emphasized in the second half of the class. Understanding ethics, environmental justice, and intellectual property rights is also the key to meaningful and compelling discussions. Discussions are a major component of class time and it is pivotal that students are stimulated to participate.

Class Learning Outcomes include the following:

- To better understand international environmental problems as a set of social and cultural issues, traditions and values
- Because we are involved in a global economy, a global culture, and a global political system, thousands of acts we all perform have environmental ramifications around the

- world. Our third objective is to better understand the consequences of our acts for the global environment. (GE criteria D2/B)
- To better understand how corporations, governments, cultural groups, non-governmental organizations, and international organizations inter-relate with respect to international environmental problems. This includes a consideration of the diversity of human society as an aspect of understanding and dealing with international environmental problems. (GE criteria D2/B)
 - To better understand poverty, population, resource scarcity, ethnicity, gender, and socio-economic status as facts involved in international environmental problems. This includes the contribution of men and women and people of various ethnicities and socio-economic groups make in dealing with international environmental problems. (GE criteria D2/D,F)
 - To define and understand various perspectives on how to interpret and act upon these issues. (GE criteria D2/C,G,H)
 - Ability to write and speak clearly and persuasively,
 - Ability to understand, articulate and utilize basic science concepts,
 - Ability to identify, understand, and evaluate competing perspectives, including developing intercultural knowledge and competence ,
 - Ability to carry out research tasks appropriate to analyzing environmental problems,
 - Ability to use concepts and methods of one discipline at higher level of synthesis, and
 - Ability to understand ethical reasoning and action (with emphasis on Intellectual Property Rights and social justice issues of Indigenous People).

High Impact Learning Outcomes developed by the American Association of Colleges and Universities (AACU) are incorporated into development of the course curricula. High impact educational practices have been shown to reduce drop-out rates, support and enrich the educational lives of college students, and increase community engagement and responsibility. This course incorporates collaborative assignments and projects; experiential learning; developing student research questions and projects; and community outreach and service. Note that these same practices that are demonstrated to enrich the educational lives of college students and are also the types of experiential and community building practices that intrinsically transmit indigenous knowledge.

The Indigenous pedagogy demonstrated in Ethnoecology is different from other college classes that students have been exposed to. Tova Fleming, spring 2011 Ethnoecology class, writes “Instead of looking at ethnoecology as something to be studied from the outside, as something alien and exotic to be pondered over in a collection of dry case studies, Dr. Steven’s brings students into contact with real living cultures through field trips and guest speakers. Our tendency, I think, in most traditionally taught classes is to study Indigenous cultures as if they were dead, as if we could have no interaction with them. My classes’ experience at Indian

Grinding Rock allowed students to experience the Miwok culture as a living culture, not just an abstract idea on the page that represented some culture that existed long ago”.

“Additionally, Dr. Stevens creates an experience that allows students to discover their own personal ‘ethnoecological’, cultural, and individual experience with the environment while learning about the validity and importance of the practices of other cultures. This personal exploration is something I have never experienced in any science class, and I think it is essential to discovering how we as individuals and our culture interact with our own ecologies and ecosystems.”

Field Trips and Experiential Learning

Field trips incorporate experiential learning into the Ethnoecology course content and are an essential component of the course. Since I have been part of the Miwok community for many years, we had the good fortune of having my peers and elders spend the day with us at Chawse Indian Grinding Rocks State Park. Students toured the traditional Miwok round house, the largest bedrock mortar in North America and museum. We discussed methods used to gather plant materials, and students were shown to give tobacco as an offering of thanks. The tribal members and elders told stories in the oral tradition. Students participated in learning to make fiber with milkweed and Indian Hemp; pine nut necklaces; or soapstone figures. Students who walked through the ancient Valley oak (*Quercus lobata*) trees in silence could themselves, and/or discuss the ecology and local Miwok ethnobotany. The need for TRM was apparent in the state park, as the forest understory plants were decadent and dying; the area needs intermediate disturbance (a controlled ground fire) to renew the forest. Students spent the day on the land choosing their own activities, working on their art projects, sharing a wonderful potluck, and enjoying cultural activities in their own way. Field trip write-ups indicated that this experience was personally very meaningful and enjoyable to students, and enhanced their appreciation of the class.

Students attended a second field trip to the California State Indian Museum, where we were honored to have our tour guided by an elder of Ohlone heritage. Students were honored with the experiential educational experience of the *medicine* or spiritual properties of beautiful baskets and regalia in the museum. It is quite rare to be given the gift of this kind of cultural knowledge unless you know someone and have developed a trusted friendship over a period of time. Traditional spiritual knowledge is usually kept very private within the Native American community. Both the students and instructor who went on this field trip received a great blessing

Student Weekly Journal Assignment

Students are assigned a guided weekly journal writing assignment, which serves as a private conversation between the student and teacher (as non-judgmental witness). The journal assignments allow students to reflect on their perception and their own cultural background, making natural history observations as spring emerges through the course time frame. Journal

assignments tracked course content, personalizing and deepening the transformational nature of the course for the students. The last guided journal entry was “How has this class deepened your relationship with plants, the land, your culture, yourself? Has it been an intellectual journey or a spiritual journey? What rewards have there been for you in this process?” Students demonstrated an openness to consider spiritual, cultural and ecological world views. One student wrote, “This class has deepened my relationship with the land, culture, and myself in many ways. It has opened my eyes to spiritual aspects. This has been a very rewarding experience as it had me examine aspects of environmental management by aboriginals, uses of plants medicinally, spiritual power in healing, and medicines. I really appreciate that we have a class like this in our Environmental Studies Department”. It is important to me that students feel accepted for their own belief systems and worldviews, while demonstrating comprehension of other cultural knowledge systems and relationship with the land. Another student writes, “This class has taught me a whole host of information about traditional practices and Indigenous peoples. However, I feel this has been an entirely intellectual journey for me. I don’t feel spiritually connected with the environment, and that hasn’t changed. I still think the class has been very valuable to me because it exposed me to ... culture and viewpoints I had never considered before, and that’s really the heart of higher education.”

Ethnobotany Group Project

The Ethnobotany Group Project is the first major class assignment. The goal is to create a collaborative group ethnobotany research project on a local scale. The focus of the group projects was to develop and administer a questionnaire investigating a question or series of questions related to the marketing of plant products in the community or culture of their choice. Students choose their own topic, with a wide variety of local markets and cultural uses of plants. For example, one group chose to determine how members of five different ethnic groups utilize different types of peppers and pepper dishes, and the plant products needed for specific culinary purposes. They ranked peppers on the Scoville heat scale, and culminated with a description of the hottest pepper on Earth. Other students chose to compare cultural uses of plant products (such as beer, olives, rice or marijuana); conducted open ended interviews with knowledgeable individuals; and provided recipes and samples during their class presentation. One student did an in-depth oral history with her aunt on medicinal plants she used in the Philippines (thanks to Skype). Some students chose to develop and administer a survey comparing shoppers at farmers markets, the coop, grocery stores, or big box stores. One student conducted oral interviews with a representative of the Mono Tribe on TEK of elderberry (*Sambucus Mexicana*). One humorous interview was conducted with individuals who train dogs to hunt truffles; pigs love truffles and ate too many, so they were training “truffle pointers” in their stead. Participants in the truffle-pointing dog business tend to be highly secretive, making the information more inaccessible than the student anticipated.

When students interviewed their own family members, it created a sense of cultural pride and self-respect among the family and community. As I have been told many times by Native American elders, it is terrible to be invisible and referred to in the past tense. Making culture visible and respecting different knowledge systems helps keep cultural knowledge alive. In sharing personal heritage, it gave both the student and their family a heightened sense of self-respect and cultural pride.

Ethnoecology Research Paper

The capstone assignment for the course required researching the TEK and TRM of one culture, one place, and management of one resource or type of resources. Students were required to integrate and synthesize cultural knowledge with western scientific methods to analyze land management and conservation. Learning outcomes demonstrated by students from successful completion of the capstone project include knowledge of the natural and human environment and the reciprocal and dialectic relationship between the two; intercultural knowledge and competence; scientific research of the literature; and writing ability.

As an example, one student conducted participant observations of his grandparents' garden. He evaluated the TRM of Hmong corn gardening practices, and the ethnobotany of medicine plants used by his grandparents. "The wisest persons I know speak broken English and reside in a state of deteriorating health, yet they routinely manage to wake by the early hours of dawn primarily to do one thing – to farm. Coarse hands and sun-hardened skin reiterate their daily excursions to a rented plot of land in the community of South Sacramento. There, they implement TEK, *a land management framework derived from generations of experimentation that integrates physical and spiritual principles* (Turner, 2000). As their grandchild, I have witnessed how vital agriculture is to them and more importantly, to the Hmong, our cultural identity." (Tushaun Vang, ENV5 163 paper, spring 2012). When Tushaun was interviewing his grandparents, they were a bit confused about the value of their backyard garden to a college class. He is the first person in his immigrant family to attend college, and his grandparents felt their Indigenous knowledge system was inferior to SEK. His parents and grandparents were proud to have the TEK of the Hmong community included in a college class project. His final paper was very well written, and selected for publication in the campus journal (**citation**),. Another student paper, and another unexpected gift, included a literature review of the Maya and Maize ethnoecology. "From a cultural perspective, restorying is as culturally important as restoration is ecologically important. The act of telling someone else's story intimately acquaints the speaker with the experience of the 'other' and deepens understanding of the scientific knowledge and cultural experience of the person they are speaking for. The process of sharing stories creates a foundation for shared identity, and for restorying the sense of place in which they live. Through shared story we can create a sense of a regional identity and acknowledge our ecological relationships that span across borders and begin to merge our cultural identifies with ecological systems. Understanding the sense of living story, from the past to the future, and the relationship

of culture to the land is an important contribution to development of environmental studies.” (Tova Fleming, ENVS 163 paper, spring 2011). This quote points to the importance of acknowledging cultural knowledge systems, and treating the oral tradition with respectful and considerable importance.. There is great healing power for Indigenous and Local communities to be visible and heard, as I have learned repeatedly from my Native American elders.

STUDENT ASSESSMENT OF VALUE OF ETHNOECOLOGY COURSE

This course focused on global learning, with the student developing an understanding of human cultures and their place in the physical and biological world. Throughout the course, students demonstrate intercultural knowledge and competence accompanied by ethical reasoning and action. In this course, understanding points of view of indigenous and local cultures that are often ignored in western scientific and technological societies As students develop an understanding of alternative knowledge systems, they practice these skills through increasingly complex assignments based on inquiry and analysis, critical and creative thinking, written and oral communication, information literacy, teamwork and problem solving. Synthesis and integration of information is demonstrated in course problems, projects and learning standards. Throughout the class I administer normative assessments as an informal way of taking a pulse of the classroom, and gathering student perceptions of the subject matter.

Students developed first-hand exploration, investigation, and inquiry/process based science skills, increasing their educational confidence, as well as creating a sense of place in their local community. Early environmental education helps to cultivate a sense of stewardship s to protect the wetlands environment, and may improve students to succeed in other areas of their lives. . Post-activity surveys indicated that participating students ended the day with a new sense of environmental stewardship and knowledge of wetland functions and that this information was shared with family members and friends.

At the end of the class, I asked students *What does ethnoecology contribute to an environmental studies curriculum?* The student examples provide an illustration of the importance of teaching ethnoecology, of making cultural knowledge visible, and respecting cultural differences. All student responses are anonymous.

- Human life is connected to the environment “Environmental Studies (ENVS) majors understand better than most that all human life is connected to the environment. The culture, economy, politics, everything can be tied back to the environment. Ethnoecology is a great way to study the connection between people and the environment. In some ways it represents the first knowledge actively passed down from generation to generation. This is because civilization itself started because of the development of agriculture. And as such every culture around the world and throughout time has developed uses for plants. In this way ethnoecology is greatly beneficial to an ENVS program.”

- When a shaman dies, a library burns down “The movie *The Shaman’s Apprentice* especially hooked me, because it eloquently illustrated the vast knowledge indigenous populations can have of plants. This class is relevant to the ENVIS program in the sense that environmental policy should consider the perspectives and cultures of local people. Regardless of geographic location, people have sustainably managed their lands for countless years. Traditional knowledge of the natural environment is often regarded inferior in contrast to western knowledge; misconceptions like these are roadblocks to discovering new information that lay hidden with the last, ancient stewards of the world. Mark Plotkin, in the movie *Shaman’s Apprentice*, says “*when a medicine man dies, it is as if a library has burned down*”. As for me, I am inspired to record as much information as I possibly can from my own elders. Not only so that their legacy may be presented, but in hopes of academically contributing to sustainable land management.”
- Advance knowledge of other cultures in addition to my own “The notion of humans and their relationship with the natural environment allowed me to tie in my own culture – that of the Hmong – to the course. My grandparents’ rugged hands, their tiny backyard abundant with distinct flora, and summer outings to a different plot of land to plant corn tell the story of knowledgeable agriculturalists who once thrived in the highlands of Laos. Additionally, I have always been infatuated with diverse interpretations of plants, animals, and the land by other cultures. Like others who struggle to understand their roots, growing up as a Hmong American created a cultural gap between preservation and assimilation. Therefore, I sought ethnoecology as a course this semester so that I may advance my knowledge about other cultures in addition to my own.”
- Relevance to understand connection between people and outdoor activities “Ethnoecology contributes to the environmental studies program because it involves the environment and its connection to the people who use it. To me, the whole idea of environmental studies has to do with people and other organisms that inhabit this planet and how they interact. Ethnoecology is just one part of the whole. This class is relevant to me because I want to work in a field that has connections between people and outdoor activities like fishing. It is relevant for me to understand why some people go about these outdoor activities in a different way from other cultural groups, and to be able to make a connection between how they use the environment as it relates to their culture.”
- Understand an environment’s instrumental and intrinsic values “I find it interesting that for centuries people have had this deep connection with the environment, particularly with using plants for medicinal purposes. It is fascinating that... Shamans know what plant can be used for what purpose. I think the contribution of ethnoecology for an environmental studies program is to give students a different perspective on what they are studying. In order , to understand an environment’s instrumental and intrinsic values, we

must look at how different cultures relate to the environment. In doing so, we learn about different perspectives, morals, relationships, and cultural values. We gain an appreciation for many places, and see different ecosystems as living and breathing systems of life, rather than a dollar sign that can temporarily stimulate our economy in the short-term.”

CONCLUSION

My journey began with the awareness that TRM, TEK and SEK form contemporary knowledge systems that are integral to building resiliency and diversity into contemporary land management and restoration practices. My professional and personal experiences with Indigenous communities from around the world allowed me to synthesize TEK and SEK in my research and teaching (citations). The rights of indigenous and local people are codified in international conservation, biodiversity, and land management treaties and law in s Article 8j *Traditional Knowledge, Innovations and Practices* of the Convention on Biological Diversity (<http://www.cbd.int/traditional/>); Article VII.8 *Involving Local and Indigenous People in the Management of Wetlands* of the Ramsar Convention of Wetlands (http://www.ramsar.org/sites/default/files/documents/library/key_res_vii.08e.pdf); and the UN *Declaration on the Rights of Indigenous Peoples* (http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf). Developing an ethnoecology course as part of an environmental studies curriculum incorporates the rights of Indigenous and Local people into co-management and utilization of cultural resources on ancestral lands. It also has the added benefit of deep and transformational learning experiences for the students to deepen their relationship with their own cultures and personal beliefs, to understand the complex cultural background of the campus and Sacramento community, and to stimulate a sense of Earth stewardship for caring for the people on this planet who have no voice.

Ethnoecology is important because the existing human relationship with the Earth is not healthy or sustainable. According to one student, “I want to understand the perceptions behind land ethics among various cultures. By exploring the ways that Indigenous peoples have lived in harmony with the land, we can begin to fully realize our place in the ecosystem. Ethnoecology is where we can define an ethos that will sustain our presence on this plane. As environmental studies students who plan to carry on environmental careers, it is imperative we develop a full, benevolent, and morally upright land ethic.”

Ethnoecology gives students examples of humankind’s ability to live in reciprocal relationship with surrounding landscapes. Learning about this sustainable past gives students faith in a sustainable future. Ecologists often perceive of human intervention in natural systems as negative, and that humans are always destructive. Ethnoecology provides specific examples of human harvesting and management of resources in natural ecosystems that are sustainable over long periods of time. Specific places on Earth where cultures have managed landscapes for centuries are iconic world heritage sites that provide a reference template for eco-cultural

restoration. For some, these sacred sites offer a spiritual, artistic and personal sense of renewal. As a classroom community, we craft a geography of hope, built through the understanding that cultures could live with the land for thousands of years in a sustainable long-term relationship. The class experience builds connections with self, family, and the local human community with its mosaic of cultural expressions of nature around, and within us.